Neuroscience

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Degree Awarded
Ph.D. in Neuroscience

Description of the Department of Neuroscience

The Graduate Program in Neuroscience, in the College of Arts and Sciences, offers doctoral training in the rapidly expanding field of neuroscience. Through coursework and independent research, students are trained to approach research problems in neuroscience with a broad perspective. Expertise in the areas of molecular and biochemical control of development, properties of receptors and ion channels in relation to cellular physiology, the cellular basis of integrative functions, and the structural basis for communication among neurons are available to all students in the program. Graduate students will receive in-depth research training in molecular, biochemical, physiological, behavioral, or anatomical sciences. In addition the Program offers unique opportunities to draw from one or more of these disciplines through multidisciplinary, cosponsored research projects. A program of highly interactive faculty and students provides an exciting focus for research training.

Admission details for the Department of Neuroscience

Students are expected to fulfill basic requirements of the Graduate School: a bachelor’s degree from a recognized university, a grade point average corresponding to B or higher, evidence of the capacity to do satisfactory graduate work as evidenced by scores on the Graduate Record Examination (GRE), and the recommendations of three former instructors. In addition, all non-native speakers of English must score a minimum of 600 (paper), 250 (computer) or 100 (iBT) on the Test of English as a Foreign Language (TOEFL). The Program in Neuroscience has the following additional requirements: one year of calculus, physics, and chemistry, demonstrated proficiency in biological sciences, and laboratory research experience. Deficiencies in these requirements do not preclude admission, and special consideration will be made to promising applicants.

Facilities of the Department of the Neuroscience

Program faculty are located in the Life Sciences Building, Centers for Molecular Medicine, and Health Sciences Center on the SUNY Stony Brook campus, and at Brookhaven National Laboratory and the Cold Spring Harbor Laboratory. Molecular facilities provide for analysis of protein and DNA biochemistry, including microsequencing, peptide mapping, synthesis of oligonucleotides and peptides, cellular transfection, and production of transgenic animals. Wide-ranging facilities for cellular and integrative electrophysiology exist for studies on dissociated neurons, brain slice preparations, neurons in situ, and genetically engineered cells in culture. Imaging facilities permit anatomical reconstruction, fluorescence measurements, and the use of ion-sensitive indicators on both conventional, confocal, and multi-photon microscopes. An image analysis core is linked to a scanning and transmission electron microscopy facility.

Requirements for the Department of Neuroscience

The Graduate Program in Neuroscience does not accept a student whose goal is a M.A. degree. In exceptional instances, a student already in the Program may be awarded a M.A. degree upon completion of an approved course of study, including 30 graduate credit hours, a comprehensive examination, a research thesis, and the minimum requirements of the Graduate School.

Requirements for the Ph.D. Degree

A. Course Requirements
1. Core courses in neuroscience (BNB 561, BNB 562, BNB 563, BNB 564). A four-semester series taught by members of the Program; the student is introduced to a broad variety of topics. These will be taken in the Fall and Spring semesters of the first and second years.

2. Neuroanatomy (BNB 560), Developmental Neuroscience (BNB 565), and Neurobiology of Disease (BNB 566). These are required short courses elaborating on fundamental topics in Neuroscience.

3. Laboratory Rotations in Neuroscience (BNB 555). A two-semester course in the Fall and Spring semesters of the first year. Students conduct research rotations in laboratories of three program members and present oral reports on their research.

4. Writing Neuroscience (BNB 551). This course is taught in the Fall semester of the first year. It provides training in the basics of scientific communication, with a strong emphasis on writing and revision. Practical exercises are designed to give experience and feedback in commonly needed aspects of scientific writing.

5. Advanced Neurobiology and Behavior Seminar (BNB 697). Seminar presentations delivered by faculty, students, associates, and visiting speakers.

6. Electives. At least two additional graduate-level courses in various biological, physical, or mathematical sciences must be selected by the student in consultation with the student’s advisor. Students may take additional elective courses if they desire.
B. Thesis Proposal
At the end of the second year of study, each student must successfully propose and defend an outline of their thesis research. The proposal consists of a written document and an oral presentation.

C. Advancement to Candidacy
The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of all course requirements and passing their thesis proposal.

D. Student Seminars
All students who have advanced to candidacy are required to give a departmental seminar on their dissertation work annually.

E. Ph.D. Dissertation
A dissertation that constitutes an original and significant contribution to the field of neuroscience is required for the Ph.D. The work must be of a quality acceptable for publication in a recognized scientific journal. At the end of the first year, students initiate a dissertation research program in a Program faculty’s laboratory. After advancement to candidacy, the student and advisor will assemble an advisory committee to guide the dissertation research. Upon completion of the dissertation research, the student will present a seminar based on the dissertation. Following this the student will be given an oral examination on the dissertation research and related areas by the dissertation committee.

F. Teaching Requirements
To gain experience in teaching, the Program requires that all students serve as teaching assistants for two semesters during the first two years of study. Usually, TA assignments are to courses taught by Program faculty. Assignments are made to minimize impact on research productivity in the second year of study.

G. Residence Requirement
The University requires at least two consecutive semesters of full-time study. The demands of the course of study necessitate a longer period of residence.

H. Academic Standing
All students must maintain a 3.0 grade point average at all times. Due to the importance of BNB 561, BNB 562, BNB 563, and BNB 564 as the basis for advanced study in Neuroscience, students who have a grade of less than a B in these courses must repeat them satisfactorily prior to taking the comprehensive examination. Any student who fails to receive a grade of B or better in more than one required course will be reviewed for possible termination from the Program. Research (BNB 599 and BNB 699) is graded on a satisfactory/unsatisfactory basis. Any student who receives a grade of U in a research course will be reviewed for possible termination from the Program.

Faculty of Neuroscience

Distinguished Professor

Professors
Evinger, Leslie Craig, Ph.D., 1978, University of Washington: Motor control and learning; Movement disorders.
Frohman, Michael, Ph.D., M.D., 1985, University of Pennsylvania: Lipid signaling pathways regulating mitochondrial, membrane organelle, and cellular shape and function.
Halegoua, Simon, Ph.D., 1978, Stony Brook University: Neuronal Growth Factor Signaling and the Control of Phenotype and Survival.
Kritzer, Mary, Ph.D., 1989, Yale University: Effects of gonadal hormones on the cerebral cortex.
Levine, Joel M., Graduate Program Director, Ph.D., 1980, Washington University: Molecular biology of nerve regeneration; nerve-glia interactions.
Matthews, Gary G., Ph.D., 1975, University of Pennsylvania: Cellular and molecular neurobiology of the retina.
McKinnon, David, Ph.D., 1987, Australian National University: Evolution and robustness of electrophysiological systems.
Morin, Lawrence P., Ph.D., 1974, Rutgers University: Neural circuitry regulating mammalian sleep and circadian rhythms.
Role, Lorna, Ph.D., Chairperson, 1981, Harvard University: Neurobiology and pathology of cortico-limbic circuits.
Solomon, Irene C., Ph.D., 1994, University of California, Davis: Neural control of respiratory motor output and fast oscillatory rhythms.
Tsirka, Styliani-Anna (Stella) E., Ph.D., 1989, University of Thessaloniki: Neuronal-microglial interactions in the physiology and pathology of the central nervous system.
Van Nostrand, William, Ph.D., 1985, University of California, Irvine: Molecular pathogenesis of CNS amyloid accumulation.

Wollmuth, Lonnie, Ph.D., 1992, University of Washington: Molecular mechanisms of synaptic transmission.

Associate Professors
Kernan, Maurice, Ph.D., 1990, University of Wisconsin: Mechanosensory transduction in Drosophila; TRP channel function; ciliary mechanisms.
Sirotkin, Howard, Ph.D., 1996, Albert Einstein College of Medicine: Molecular genetics of vertebrate neural development.
Talmage, David A., Ph.D. 1981 University of Minnesota: Neuregulin signaling and synaptic homeostasis

Assistant Professors
Aguirre, Adan, Ph.D., 2002, Centro de Investigacion y de Estudios Avanzados IPN (CINVESTAV-IPN), Mexico: Cellular and molecular biology of neural stem/progenitor cells during normal development and after brain injury or disease.
Bowen, Mark, Ph.D., 1998, University of Illinois, Chicago Medical Center: Coordination of post-synaptic glutamate receptor signaling by the MAGUK family of scaffolds.
Colognato, Holly, Ph.D., 1999, Rutgers University: Molecular mechanisms that control oligodendrocyte function during nervous system development and during disease.
Czaplinski, Kevin, Ph.D., 1999, UMDNJ-Robert Wood Johnson Medical School: Post transcriptional control of gene expression in the nervous system.
Fontanini, Alfredo, M.D., Ph.D. 2002, University of Brescia, Italy: Behavioral electrophysiology of taste and olfaction.
Ge, Shaoyu, Ph.D., 2002, University of Science and Technology of China: Development of new neurons in the adult brain.
La Camera, Giancarlo, Ph.D., 2003, University of Bern: Learning and decision making: Theoretical Neuroscience.
Maffei, Arianna, Ph.D., 2002, University of Pavia (Italy): Experience-dependent plasticity of neocortical circuits.

Adjunct Faculty
Dubnau, Josh, Ph.D., 1995, Columbia University: Genetic dissection of memory in Drosophila
Enikolopov, Grigori, Ph.D., 1978, Academy of Science, Russia: Stem cells, neurogenesis, and signal transduction.
Gifford, Andrew N., Ph.D., 1989, St. Andrews University, Scotland: Pharmacology of brain receptors and neurotransmitter release.
Huang, Z. Josh, Ph.D., 1994, Brandeis University: Development and plasticity of the neocortical GABAergic circuits.
Kepecs, Adam, Ph.D., 2003, Brandeis University: Neurobiology of decision-making, neuromodulation, behavioral electrophysiology.
Li, Bo, Ph.D., 2003, University of British Columbia: Regulation of NMDA receptor function in hippocampal neurons.
Thanos, Peter, Ph.D., 1997, Eastern Virginia Medical School: Behavioral neuropharmacology and neuroimaging of addiction (including alcohol, drugs and food) and ADHD.
Turner, Glenn\textsuperscript{10}, Ph.D., 2000, California Institute of Technology. Neural coding; learning and memory; sensory processing; \textit{Drosophila}; electrophysiology.

Zador, Anthony\textsuperscript{10}, M.D., Ph.D., 1994, Yale University: Cortical circuits underlying auditory processing and attention.

Zhong, Yi\textsuperscript{10}, Ph.D., 1991, University of Iowa: Neurogenetics.

Number of teaching, graduate, and research assistants, fall 2009: 34

1) Primary appointment with Biochemistry
2) Primary appointment with Biomedical Engineering
3) Primary appointment with Neurosurgery
4) Primary appointment with Pediatrics
5) Primary appointment with Pharmacology
6) Primary appointment with Physiology and Biophysics
7) Primary appointment with Psychiatry
8) Primary appointment with Psychology
9) Primary appointment with Brookhaven National Laboratory
10) Primary appointment with Cold Spring Harbor Laboratory

\textit{NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.}\n